N.E. COAL BLOCK POWER SUPPLY PROJECT

SUMMARY ENVIRONMENTAL PROTECTION REPORT AT COMPLETION OF CONSTRUCTION

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ENVIRONMENTAL AND SOCIO-ECONOMIC SERVIES

ENGINEERING SERVICES DIVISION

N.E. COAL BLOCK POWER SUPPLY PROJECT

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N.E. COAL BLOCK POWER SUPPLY PROJECT

SUMMARY ENVIRONMENTAL PROTECTION REPORT

AT COMPLETION OF CONSTRUCTION

A. SUMMARY

B.C. Hydro was requested by the Provincial Government to supply electrical power to the N.E. Coal project with an inservice date on 15 October 1982. An Environmental Officer (EO) was assigned to the project during spring 1981 with the principal functions to check tender documents for environmental input, to identify additional sensitive areas along the transmission lines, plan and layout access roads, monitor road construction activities and recommend corrective measures.

A thorough review of the appropriate project reports including Environmental Assessments, Heritage Studies, contract documents, maps and photos provided an overall understanding of the project requirements and constraints.

In conjunction with individual clearing contractors and Hydro Force Construction, preliminary access plans and road alignment plans were developed by field assessment and flagging of road locations on the ground. Access plans were discussed with the Resource Agencies to obtain their approval.

Full-time field inspection assisted in ensuring that road construction and related activities met the environmental guidelines and contract specifications. Any problem was conveyed to Hydro's senior on-site supervisor for his instruction of the corrective measure to the contractor. Daily reports were submitted to record activities and define progress.

The objective of long-term access for maintenance required a reliable road system along the transmission lines. At the request of the Project Manager, the EO participated in the compilation of the restoration program for the project including reclamation of certain roads, cleanup of slash along off-R/W roads, repair and improvement of roads, installation of waterbars and culverts, and grooming of R/Ws. This program is presently being finalized by Transmission Projects Division and will be implemented during 1983 to 1985 seasons.

The Environmental Officer function was initiated on the N.E. Coal project and assisted in providing a reasonable degree of environmental protection. On-site planning with the contractors was the key factor in controlling road construction and ground disturbance. Some problems arose in regard to access due to the breakdown of communications between inspection staff and the various phases of the operations, insufficient field assessment by the EO or lack of on-site supervision by the contractors.

B. INTRODUCTION

B.C. Hydro was requested by the Provincial Government to supply electrical power to the N.E. Coal Project. The inservice date for the transmission line was set for 15 October 1982. Environmental impact assessment studies of the preferred routes were carried out by Sigma Resource Consultants Ltd. during 1980. Contracts for clearing the transmission line R/W were awarded during spring 1981. At that time, an Environmental Officer (EO) was assigned to the project to work under the supervision of the senior on-site supervisor for Transmission Construction Department with headquarters in Chetwynd, B.C.

The principal functions of the Environmental Officer were:

1. To check the tender documents for the project and ensure the specifications conformed to the recommendations contained in the environmental impact assessment studies.

2. To identify additional sensitive areas along the transmission line rights-of-way and define protective measures or constraints to be incorporated into subsequent access development plans.

3. To plan and lay out access roads in cooperation with each contractor and Hydro Force Construction.

4. To review and submit access road plans to the local Resource Agencies for their approval.

5. To inspect and ensure construction activities met the environmental guidelines set out in the contract specifications.

6. To report any environmental damage or problems caused by construction activities and recommend corrective measures to the senior on-site supervisor for his evaluation and action with the contractor.

7. To compile the restoration requirements for the project to ensure security of the line, protection of access roads and mitigation of damaged or sensitive areas.

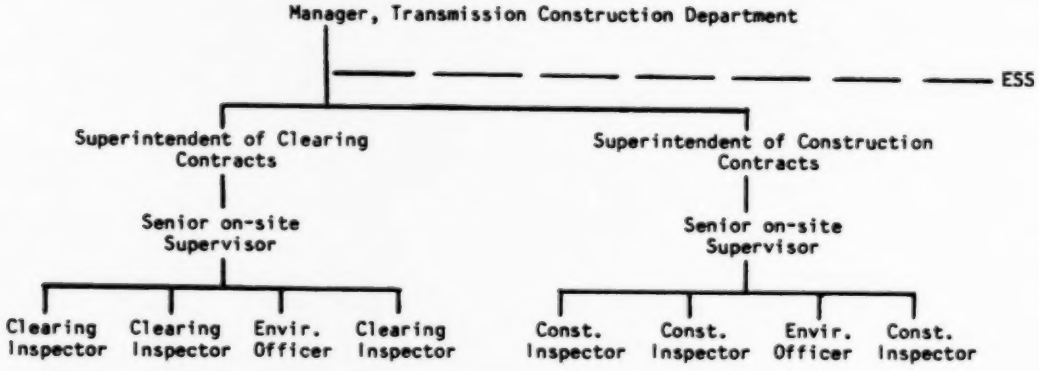
C. PROJECT DESCRIPTION

Three 230 kV lines were constructed during 1981/82:

	(km)
GMS x Tumbler Sub	127
Tumbler Sub x Quintette	20
Tumbler Sub x Bullmoose	28
TOTAL	175

The transmission line originates at the G.M. Shrum generating station at the Bennett Dam and travels in a southeasterly direction to Tumbler substation. Separate lines radiate to the two coal development sites at Quintette and Bullmoose. Refer to Key Map.

The organization responsible to administer contractor compliance with the environmental and technical requirements of the contract documents was the Transmission Construction Department. Their inspection team included the following personnel and reporting relationships:



D. PRE-CONSTRUCTION PREPARATION OF ENVIRONMENTAL OFFICER

The most up-to-date reference information was made available to the EO in order to develop an overall appreciation and understanding of the access development requirements and other constraints of the project. Such information included:

1. Stage Two Environmental Assessment Report of Proposed N.E. Coal Transmission Lines by Sigma Resource Consultants, Ltd., November 1980.
2. Heritage Studies of Proposed N.E. Coal Transmission Lines by Points West Heritage Consulting Ltd., 1981.
3. B.C. Hydro Clearing and Construction Contract documents.
4. Vertical Air Photos, scale 20 and 40 chain.
5. Clearing Strip Maps.
6. Base Maps for Access Development Plans compiled by Hydro Route Engineering.

A thorough review and study of the above information assisted in the formulation of access development plans for the project.

The EO attended the pre-job meeting for each contract and outlined the access plan requirements and procedures to be followed in the field.

Also, initial contacts were made with the Resource Agencies to establish communication channels at the field level and confirm procedures to fulfil Licence to Cut obligations and other environmental requirements.

E. DEVELOPMENT OF ACCESS

The procedure used to develop the access and road alignment plans is described in the following subsections.

(a) Initial Field Assessment for Preliminary Access Plan

All existing access was checked on the ground leading to or near the R/Ws which recorded the condition and restrictions for such roads. It was then necessary to formulate a preliminary plan showing the existing roads and trails, the logical placement of new road locations to the R/W, and the access alternatives to cross a river, ravine, swampy area, etc. Such plan incorporated any applicable contract specification and environmental constraint requirements.

The above plan was discussed fully with the clearing contractor who had considerable knowledge of the ground along his section of the R/W. The contractor decided which alternative access routes would be proposed and then submitted to B.C. Hydro a preliminary access plan (scale 1:50 000) for his portion of the R/W. This plan showed the existing roads to be used for his operation, the proposed new road locations providing access to the R/W, and the projected road locations along the R/W with cutoffs at severe ravines, major streams, etc.

(b) Resource Agency Involvement

The EO and respective clearing contractors met with personnel of the Resource Agencies to review the contractor's preliminary access plan. Based on these discussions, required revisions were applied to the access plan. Approval was then granted to B.C. Hydro by the Ministry of Forests and the Ministry of the Environment to start construction on that specific section of the R/W.

The EO compiled the final proposed access plan (scale 1:50 000) and submitted copies to the Resource Agencies and the clearing contractor for their reference and guidance. If a revision was required to the access plan, the EO would review such revision

with the appropriate Resource Agency and convey their agreement to the contractor.

Hydro Force Construction (HFC), which was responsible for line construction, required additional access along the R/W including the upgrading of existing roads and the extension of new roads to the structure sites. The EO and HFC inspected these additional access requirements on the ground to ensure their feasibility. Then the EO reviewed and updated the access plan maps previously submitted to the Resource Agencies to include these additional access requirements for the line construction phase. Any comments or constraints made by the Resource Agencies were conveyed to HFC prior to the start of construction. Occasional updates were provided to the Resource Agencies on road construction progress and any problems encountered or revisions required.

The Resource Agencies contacted for review and acceptance of the access plans were:

1. Ministry of Forests, Chetwynd and Dawson Creek.
2. Ministry of Environment:
   a. Fish and Wildlife, Fort St. John.
   b. Water Management, Fort St. John.

(c) Detailed Field Assessment and Access Road Layout

The Environmental Officer with each clearing contractor examined his specific access routes to the R/W as proposed by the foregoing access plan map and flagged the final locations on the ground for construction. Such road location work included a thorough investigation of all ground conditions along the proposed route, the identification of critical points, the establishment of preliminary grade lines and the flagging of the final road location.

Road locations along the R/W were projected along the high side if ground conditions were fairly uniform. Where the road had to be built through a ravine, across a creek or some other irregular ground condition, the EO and contractor assessed the crossing and flagged the most suitable route on the ground that would cause least disturbance and environmental damage.

Road alignment plans were plotted on strip maps for B.C. Hydro approval and control. In general, this procedure was short-circuited by the EO who recorded the road location on the strip map at the time of flagging with the contractor and gave verbal permission to the contractor to proceed with construction. Time constraints did not permit the formal procedure of submission of road alignment plans by the contractor, however, the EO conveyed such information to Hydro's senior on-site supervisor on a continual basis.

The EO in consultation with HFC prepared strip maps of the R/W showing existing roads and projections for road extensions with all environmental constraints notated. Roads constructed by the clearing contractors were used in the plan wherever possible to minimize ground disturbance and provide a single access road system for the transmission line. This road alignment plan was used by HFC for their guidance and control.

(d) Specific Problems Associated With Access

Road construction was the principal activity that caused damage to terrain and drainage courses. Site planning was the key factor in minimizing ground disturbances which included field access investigation, road layout and full-time inspection of construction activities. Communications to all phases of the operations occasionally broke down resulting in minor environmental damage. Such problems generally arose due to insufficient field assessment by the EO or lack of on-site

supervision by the contractors. Examples of these problems which resulted in minor environmental damage are:

1. Unauthorized fording of Moberly and Bullmoose rivers by contractor's equipment.

2. Occasional section of road constructed along R/W which was not suitable for line construction and therefore a second road was built.

3. Occasional road constructed up steep hill encountered rock problems and had to be abandoned.

4. Alternate access constructed to R/W by contractor without prior notification to Hydro inspection staff and approval from Resource Agencies.

5. Occasional unauthorized crossing of gas pipelines by contractor's equipment.

These problems were infrequent in terms of the overall construction project. Environmental damage caused by these activities was either of a temporary nature or will be corrected during the restoration phase of the work.

F. FIELD INSPECTIONS AND REPORTS

Full-time inspections were carried out:

- to ensure roads were constructed on flagged locations and to contract specification standards.

- to identify problems such as damage to roadside trees, existing roads and ditches, creek crossings, etc.

- to discuss and instruct each contractor of any corrective or protective measures required in his work area - for example, a small creek crossing requires clean out of brush and slash and the placement and subsequent removal of several small logs for a temporary equipment crossing.

- to check all heritage sites on or near the R/Ws to ensure that effective protective measures are carried out.

- to request clearing standard changes if necessary adjacent to river courses in order to provide adequate protection and stability for their banks and floodplains.

- to assess and define the requirements for a log bridge across Highhat Creek and the installation of several pipeline crossings according the National Energy Board specifications.

- to compile detailed "as built" sketches on R/W strip maps showing roads constructed, drainage facilities installed and additional protective measures required. These sketches provided input for the restoration program.

The Environmental Officer submitted daily reports to the senior on-site supervisor to record his activities and contacts, define the progress and standard of road construction, and identify environmental problems with proposed corrective measures. Monthly summaries were also submitted to the Program Co-ordinator, Environmental and Socio-Economic Services.

G. RESTORATION PROGRAM

The objective for long-term access for line maintenance was defined as a reliable 4-wheel drive road system to and along the transmission line where practical. This access requirement is necessary to ensure the

security of the 230 kV transmission lines which are part of a radial system with no alternative supply.

The Project Manager requested the EO to compile a summary of restoration measures for the transmission line R/Ws including the following work requirements:

- reclamation (put to bed) of sections of access roads not required for transmission line maintenance.

- restoration of occasional drainage and the installation of erosion ditches.

- cleanup of slash along both sides of off-R/W roads.

- repair of all access roads including grading, ditching, waterbars, culverts and gravel fill for wet sections.

- miscellaneous Ministry of Forests requirements.

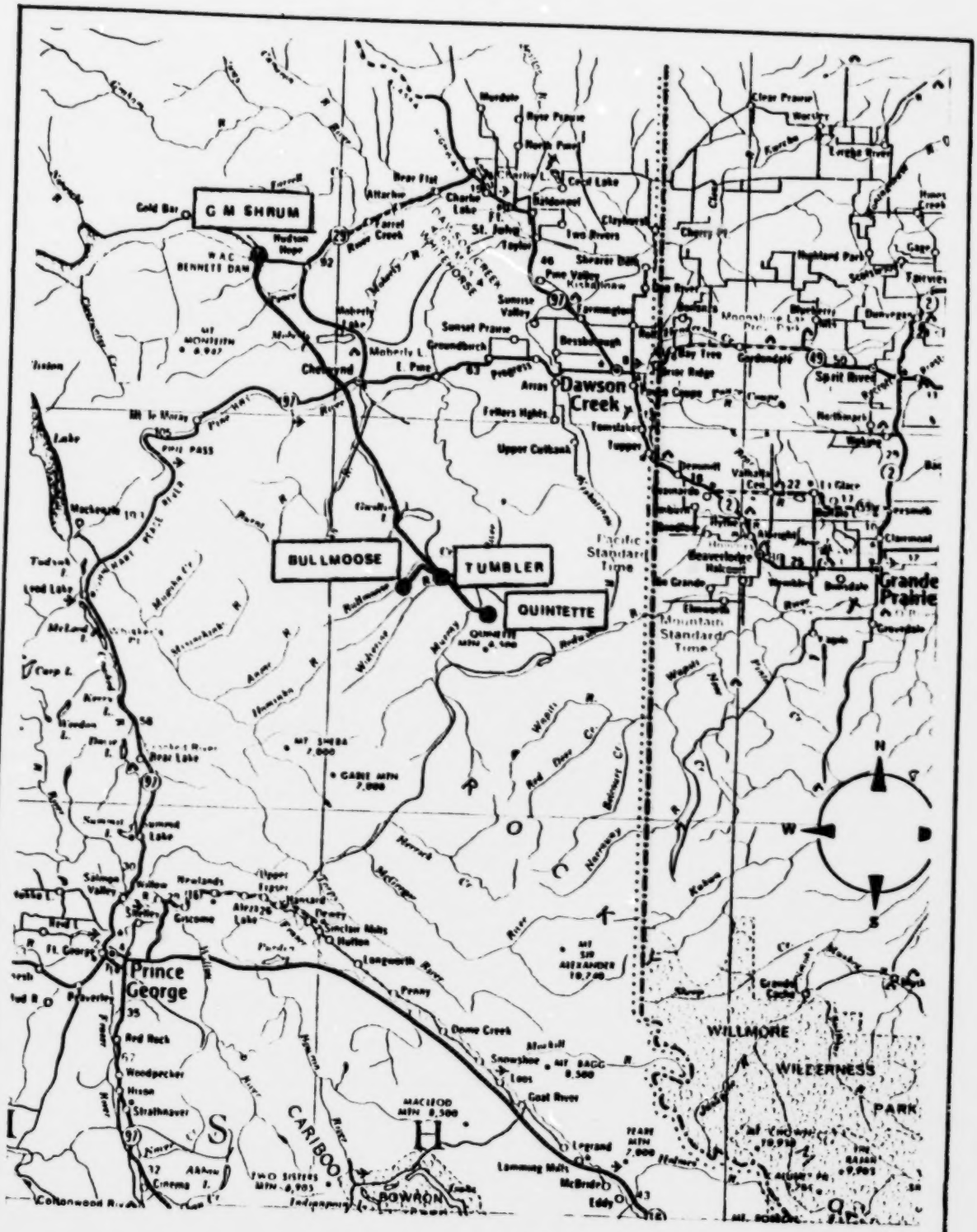
- grooming of R/Ws including spreading and trampling of overburden and stumps, drainage control around structures and scarification of work sites for hand seeding.

The restoration program is presently being developed by Transmission Projects Division and will be carried out during 1983 to 1985 summer seasons. During fall 1982, protective measures were limited to the essential requirements such as structure security, slash cleanup of principal access roads leading to the transmission lines, and the installation of waterbars along roads with moderate to steep grades.

H. ENVIRONMENTAL PROTECTION PROGRAM

Since the completion of the N.E. Coal Block Power Supply, B.C. Hydro has applied the experience gained on this project to develop environmental inspection and protection procedures on other construction projects.

Formal documentation now includes an Environmental Procedures Manual and project specific Environmental Index Maps and commitment lists. This information is used by the Environmental Officer and other inspection staff to ensure compliance with environmental protection measures.



KEY MAP

NE COAL 230 KV TRANSMISSION LINES

SCALE 1:2,000,000

JUNE, 1983